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## CLAIMS

What is claimed is:

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1. A method for generating an image of an object comprising  
irradiating the object with a source of radiation,  
measuring both a sampled and limited data set of transmitted  
intensities wherein said transmitted intensities are related to at least one  
coefficient characterizing the image by an integral operator, and  
directly reconstructing the image by executing a prescribed  
mathematical algorithm, determined with reference to said integral operator,  
on said transmitted intensities.

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2. The method as recited in claim 1 wherein said at least one coefficient is a diffusion coefficient.

3. The method as recited in claim 1 wherein said at least one coefficient is an absorption coefficient.

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4. The method as recited in claim 1 wherein said at least one coefficient includes both an absorption coefficient and a diffusion coefficient.

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5. A method for generating an image of an object comprising  
irradiating the object with a source of radiation,

1                   measuring both a sampled and limited data set of transmitted  
intensities in a paraxial arrangement wherein said transmitted intensities are  
related to at least one coefficient characterizing the image by an integral  
operator, and

5                   directly reconstructing the image by executing a prescribed  
mathematical algorithm, determined with reference to said integral operator,  
on said transmitted intensities.

6. The method as recited in claim 5 wherein said at least one coeffi-  
10   cient is a diffusion coefficient.

7. The method as recited in claim 5 wherein said at least one coeffi-  
cient is an absorption coefficient.

15               8. The method as recited in claim 5 wherein said at least one coeffi-  
cient includes both an absorption coefficient and a diffusion coefficient.

9. The method as recited in claim 5 wherein the source of radiation is  
a single source and the paraxial arrangement is composed of the single source  
20   and an on-axis detector and at least one off-axis detector and the measuring  
includes moving the arrangement proximate to the object to obtain the data  
set of transmitted intensities.

1           10. A system for generating an image of an object comprising  
              a source of radiation for irradiating the object,  
              a detector arrangement for measuring both a sampled and lim-  
ited data set of transmitted intensities wherein said transmitted intensities  
5   are related to at least one coefficient characterizing the image by an integral  
operator, and  
              a reconstructor for directly reconstructing the image by exe-  
cuting a prescribed mathematical algorithm, determined with reference to  
said integral operator, on said transmitted intensities.

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          11. The system as recited in claim 10 wherein said at least one coef-  
ficient is a diffusion coefficient.

          12. The system as recited in claim 10 wherein said at least one coef-  
15   ficient is an absorption coefficient.

          13. The system as recited in claim 10 wherein said at least one coef-  
ficient includes both an absorption coefficient and a diffusion coefficient.

20           14. A system for generating an image of an object comprising  
              a source of radiation for irradiating the object,  
              a detector arrangement for measuring both a sampled and lim-  
ited data set of transmitted intensities in a paraxial arrangement wherein said

1 transmitted intensities are related to at least one coefficient characterizing  
the image by an integral operator, and  
a reconstructor for directly reconstructing the image by exe-  
cuting a prescribed mathematical algorithm, determined with reference to  
5 said integral operator, on said transmitted intensities.

15. The system as recited in claim 14 wherein said at least one coef-  
ficient is a diffusion coefficient.

10 16. The system as recited in claim 14 wherein said at least one coef-  
ficient is an absorption coefficient.

17. The system as recited in claim 14 wherein said at least one coef-  
ficient includes both an absorption coefficient and a diffusion coefficient.

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18. The system as recited in claim 14 wherein the source of radiation  
is a single source and the paraxial arrangement is composed of the single  
source and an on-axis detector and at least one off-axis detector.

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